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List II No. 2747

Para phenylene diamine

D. Soviet Bloc Needs and Availabilities

No information available

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List II No. 2600-2692METALS, MINERALS AND THEIR MANUFACTURESGeneral Observations on Soviet Needs and Availabilities

With a steadily growing output, the supply of most metals in the USSR, including imports, is believed to be adequate for the planned development of essential industries and for peacetime requirements of the army. Any additional allocations to the military at present or in the near future, however, would be at the expense of essential industrial supplies or minimum stockpiles.

Domestic production of ordinary steels and of aluminum is relatively more adequate to meet existing and prospective needs than the output of any other strategic metals, but even these are increasingly in demand from abroad, especially by the satellite countries. In the case of most nonferrous metals and certain types of special steels, the USSR depends more heavily upon imports to supplement its own output. This dependence appears to be greatest in the case of tin, but extends also to copper, lead, zinc, tungsten, molybdenum, and bauxite. There is little information on other nonferrous metals.

It is believed that the USSR is able to satisfy its current import needs in large measure, but not entirely, through receipts from other Soviet bloc countries, with China and Korea delivering tin, tungsten, and molybdenum; Poland, lead and zinc; and Hungary, bauxite. Relatively small quantities of these metals are obtained in the West; however, Western sources supply the USSR with its entire import needs for copper and unknown quantities of ferroalloys and alloying metals. It is believed that Czechoslovakia may be delivering to the USSR as much as 200,000 tons of high-grade alloy steels per year. Until the imposition of US export controls, the USSR imported from this country large quantities of pipes and tubing, wire and cable. Czechoslovakia is now supplying some of these products while others are being procured in Western Europe.

The increase in the tempo of Soviet armaments production has apparently created shortages of various degrees of severity. Increased domestic output may not be expected to fill this gap in the short run. Possibilities of covering the shortages through substantially larger imports from the Soviet satellites are limited, because of the unsettled conditions in the Far East and because the USSR could not afford to push exploitation of its

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European satellites to the point of seriously weakening their own economies.

The development of the economic and war potentials of the USSR would probably be retarded by a loss of supply sources for metals and metal products outside the Soviet bloc. The ability of the USSR to assist in the industrialization of the more backward satellites, and to keep the industries of the technologically more advanced countries operating at full capacity, would also be noticeably reduced. In such an eventuality the USSR would give priority to its own needs and its satellites would therefore be the first to suffer the consequences.

Internally, the repercussions would be felt primarily in the machine-building, electrical equipment, electronics, and oil industries, with secondary effects throughout the rest of the economy. Marginal consumers of metals might find their allocations further reduced or entirely cut off. It is not known to what extent, if any, Soviet programs for the development of atomic energy and jet propulsion would be affected. In general, the USSR would be able to adjust itself to the altered conditions of supply, but the rate of its industrial progress would be retarded and its potential for waging full-scale war correspondingly limited.

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Allow steel bearings and parts with
inner ring bore diameters as follows:

- (a) Balls: over 15 mm but less than 60 mm;
- (b) Rollers: over 20 mm but less than 70 mm.

D. Soviet Bloc Needs and Availabilities

USSR current production of all types of anti-friction bearings in the USSR is quantitatively and qualitatively below minimum industrial requirements. Estimated anti-friction bearing production for 1950 is 60 million units as compared with estimated 1950 requirements of 85 million units. Total orbit 1950 production (USSR and European satellites) is estimated at 66 million units against total requirements of 111 million units.

Under conditions of normal economic expansion this deficit will probably continue through the next three or four years because of the limited capacity of the Soviet bearings industry and the high rate of bearing replacement necessary for Soviet machinery. Increased restriction or embargo of non-orbit sources of bearing supplies would therefore have an immediate and long term restrictive effect on the entire Soviet industrial structure.

1. Weaknesses. A general review of the weaknesses and limitations of the Soviet bearing industry indicates the extent of Soviet vulnerability to increased Western export controls.

(1) Quantitative and qualitative limitations on capacity. The Soviet bearing industry has been slow to develop and is poorly equipped. The majority of the machinery in the eight producing plants was obtained through prewar imports, lend-lease, and postwar reparations. More than 80 percent is of prewar manufacture and is currently old and obsolete.

(2) Shortage of high-quality raw materials. Although domestic production of bearing steels is adequate for simpler bearing types, there is a critical shortage of special, high-alloy varieties necessary for precision bearings. Swedish steel is used whenever available.

(3) Lack of skilled labor and advanced technical know-how. The chronic Soviet shortage of skilled labor, combined with the extremely complex, precision processes required for bearing manufacture, have caused the Soviet bearing industry to lag far behind the high technological levels maintained by its Western counterparts.

(4) Poor

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(4) Poor quality and limited number of types. Soviet bearings are generally recognized as being qualitatively inferior to those manufactured in Western Europe and the US. In some instances Soviet authorities have refused to accept equipment from the satellites which contained Soviet-made bearings. Indicative of the limited range of bearing types manufactured by the USSR is the fact that before the Second World War the USSR manufactured only one thousand different types of roller bearings while in the West some 12,000 different types were available. A considerable number of high-quality precision bearings are not produced at all in the USSR and foreign sources are relied upon to supply such units. In the production of bearings for jet aircraft, for example, the Soviet Union relies on non-orbit manufactured types almost exclusively, the Swedish SKF plant being the principal supplier.

ii. Extent of imports from the West. Soviet imports from the West since the war have continued at a rate not far below prewar and wartime levels. Before the war the USSR depended heavily upon Sweden and Germany for supplies of precision bearings as well as large quantities of the simpler types. During the war a very large share of requirements was supplied by the United States, which shipped an estimated 25 million units. Imports from Sweden were also increased. Official foreign trade statistics for postwar years provide ample evidence that imports have declined relatively little in volume or quality. During 1947 as much as 60 percent of Sweden's SKF output is estimated to have gone to the USSR. The majority of legal shipments from Western Europe have been based on trade agreements. Principal suppliers have been Sweden, Italy, Austria, and Switzerland, with smaller shipments coming from the UK, France, and Benelux. US exports have dropped precipitously from \$1 million worth in 1947 to negligible quantities during the last few years.

The following table gives some indication of the approximate volume of Western bearing exports to the USSR.

ESTIMATED EXPORTS OF ANTI-FRICTION BEARINGS
TO THE USSR FROM SELECTED EUROPEAN COUNTRIES, 1949

(In thousands of units)

Italy	1,200
Austria	1,000
Sweden	440
West Germany	10
Covert Shipments	2,000 a/
TOTAL	4,650

a/ Includes units from the UK, France, Switzerland, Benelux, and the US.

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An additional source of supply and one which is extremely difficult to estimate consists of reallocated Western shipments to the satellites. There is considerable evidence that the USSR was the ultimate destination of the more than 14 million units estimated shipped to satellite addresses by non-orbit suppliers during 1949. Of probably even greater value to the Soviet Union than the large volume of these Western exports, which may have equalled as much as one-fifth of Soviet domestic output during the period 1945-1950, is their better-than-Soviet-standard quality and the high percentage of precision types.

Clandestine trade in bearings between Western Europe and the Soviet orbit has grown to large scale proportions during the past five years. Shipments vary in size from carload lots to suitcase loads. Besides providing further proof of the pressure of Soviet demand, these shipments serve as an accurate barometer of the types and sizes most critically needed. Analysis of a large number of reliable intelligence reports indicates beyond doubt that satellite illegal purchases and imports are centrally directed by Moscow. The specifications and characteristics of the bearings involved in these shipments are frequently identical and indicate a high priority being given to sizes needed for tanks, aircraft, and other military items. The principal routes are through Western Germany, Switzerland, Austria, and Italy.

Additional and undetermined increments of bearing supply from Western sources reach the USSR through imports of bearing parts and in units already installed in machinery imports. These hidden imports are most significant for the specialized types which they provide, and there has been evidence that the USSR imports some machinery purely to secure the particular sizes of bearings contained in them.

iii. Effects of increased Western restrictions or embargo.
Increased or complete isolation of the USSR from Western supplies of anti-friction bearings, high-grade bearing steels, and specialized bearing equipment would have an immediate and prolonged restrictive effect on Soviet industrial output. Although it is impossible to estimate the precise degree of damage or restriction which a bearings embargo would incur, it is obvious that the effects would be far-reaching and cumulative throughout the economy -- for example, restriction of output of certain types of machine tools might cut down output of Diesel motors, delays in production of oil drilling equipment might reduce planned fuel output. Inability to obtain Western bearings would compel the more extensive use of inferior Soviet types in a wider range of industrial equipment, with the resultant increased breakdowns and lower productivity. An immediate and extremely important effect would be the interruption of Soviet military stockpiling programs and in the long term their probable

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diminution to meet urgent demands formerly satisfied directly by Western imports. In the event of war the strains imposed by the absence of Western bearing supplies would be much greater, and extremely critical shortages interdicting production of essential military and industrial items could only be avoided by the use of foreign-made stockpile supplies.

iv. Ability to cushion impact of increased Western restrictions.

The impact of a loss of Western imports would be countered almost entirely by resort to stockpiles. There is no substitute for anti-friction bearings. Under some circumstances plain bearings will function satisfactorily but they cannot be used for replacements in equipment designed originally for anti-friction types. Assuming that the most extensive possible redesign of equipment would be undertaken, it is doubtful that existing anti-friction bearing requirements could be lowered by more than a few percent. Strict allocation of the cream of domestic production to the most strategic industrial and military users and renewed efforts to obtain critical bearings through clandestine trade would be of limited value.

Although it is a known fact that stockpiling has probably been going on during the last several years, there is no available evidence concerning size of these stocks. Undoubtedly they consist largely of the specialized and precision types which the USSR is incapable of producing. It is virtually impossible to determine whether Soviet imports of anti-friction bearings have been in excess of normal requirements (because of the variance between planned and real expansion), but the unique Soviet policy of giving strategic stockpiling requirements priority over those of normal stock inventory makes it seem probable that reserve quantities may by now be fairly large. Consequently, although a Western embargo might have considerable effect on normal peacetime industrial expansion, the hampering effect on the military-industrial potential under war conditions might not be so great. It seems obvious that the power of Soviet bearing stockpiles to reduce vulnerability to Western embargoes depends directly on the length of time that Western East-bound bearings exports are permitted to continue.

v. Area of maximum harm. Although the entire anti-friction bearings category is one in which the USSR is directly vulnerable to Western export restrictions, the specialized and precision types and the larger and smaller sizes are outstanding as items in critically short supply. They are required primarily by aircraft, metallurgical, petroleum and machine tool industries.

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Eastern European satellites. The USSR is the only major producer of anti-friction bearings within the Soviet orbit. Total satellite output of approximately 6 million units yearly comes almost entirely from Czechoslovakia and Eastern Germany and is far below the minimum requirements of these two countries alone. The bulk of even this negligible output is dependent upon the import of bearing parts (steel balls, races, and other sections) from the USSR or the West so that in strict terms most satellite output must be classified as assembly rather than manufacture.

The following table indicates the inability of satellite industry to meet its minimum bearing requirements without outside help:

THE EUROPEAN SATELLITES' ESTIMATED 1950 PRODUCTION
AND REQUIREMENTS FOR ANTI-FRICTION BEARINGS
(In millions of units)

<u>Country</u>	<u>1950 Output</u>	<u>1950 Requirements</u>
Czechoslovakia	1.0	12.0
Eastern Germany	4.5	8.0
Rumania	.35	2.0
Hungary	0.0	3.0
Poland	0.0	2.0
Bulgaria	0.0	0.5
Albania	0.0	0.5
Austria (Soviet Zone)	0.0	3.0
TOTAL	5.85	31.0

Increased restrictions or embargo of Western anti-friction bearing shipments would severely limit satellite military and industrial potential. During the entire postwar period, deficit bearing supplies have been a critical obstacle to every branch of satellite industry. All of the bearings problems prevalent in Soviet industry -- shortage of specialized and precision units, limited range of sizes and types, obsolete and worn-out equipment, lack of skilled labor and abnormally high rates of replacement, -- are greatly intensified in the satellite countries.

Satellite industry is totally dependent upon Moscow for allocation of anti-friction bearing supplies received from the USSR and outside the orbit. Likewise, Moscow determines what percentage of East German and Czech production will be retained for their own or other satellite needs. Consequently, the intensity of satellite bearing shortages depends directly on Soviet immediate and long-term

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requirements. Available evidence indicates that the USSR has supplied only a negligible quantity of bearings to satellite industry, barely enough to permit production of high-priority military and industrial items designed solely for Soviet use.

Because of Soviet allocation of non-orbit anti-friction bearings shipments, it is extremely difficult to estimate exactly their importance in easing satellite bearings shortages. The following table shows estimated exports from the West to the satellites during 1949.

**SATELLITE IMPORTS OF ANTI-FRICTION BEARINGS
FROM SELECTED NON-ORBIT COUNTRIES DURING 1949**

(In thousands of units)

Italy	4,000
Austria	3,600
Sweden	1,500
UK	150
France	270
Switzerland	230
US	100
West Germany	590
Illegal shipments of different origin	4,000
TOTAL	14,440

As has been the case with legal shipments a great majority of the units received by the satellites through clandestine channels may be presumed to go directly to the USSR.

In view of the almost total dependence on foreign-made bearing supplies, the denial of Western shipments to the satellite countries would undoubtedly have an immediate and severe effect on their industrial and military output. Because of their "servant-master" relationship to the USSR, which is itself dependent on Western shipments, it seems inevitable that resultant satellite bearing shortages would be more severe than those of the Soviet Union. In the face of such bottlenecks almost all satellite output requiring precision or high quality bearings would be that specifically designated by the USSR, the necessary bearings being doled out from Soviet stockpiles. A long term effect would be to increase the tendency of the satellites to become an economic burden to the USSR, -- in this case due to their constant need for specialized and precision types essential for the maintenance of minimum industrial output and transport requirements.

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Nitric Acid and the following nitrates:
ammonium, guanidine and potassium nitrate

D. Soviet Bloc Needs and Availabilities

The USSR appears to have considerable supplies of the basic components of the subject chemicals and a large capacity for the manufacture of nitric acid, synthetic ammonia, ammonium nitrate and potassium nitrate. However, in terms of total Soviet Bloc needs in a period of extensive military end-use production, it is unlikely that Soviet production is sufficient to fill the needs of the Bloc.

The Far East is especially deficient in nitric acid and ammonium nitrate. The latter deficiency has been greatly increased by the bombing of the Hungnam Chemical plant in North Korea. The US Air Force reports that this plant is no longer able to operate. Captured records indicate that the plant formerly supplied great quantities of nitrogenous explosives and chemicals to China, North Korea and Siberia.

In any full-scale conflict it is even more likely that Soviet Bloc needs would far exceed availabilities. During World War II the US shipped 3,394 short tons of ammonium nitrate and 2,190 tons of potassium nitrate to the USSR under Lend-Lease. Diversion from non-military uses during a war, especially from fertilizers, would eventually have a deleterious effect on industrial crops such as cotton, flax and sugar beets.

Small amounts of these nitrates have been moving into the Bloc. Italy shipped 112 tons of nitric acid and ammonium nitrate to Czechoslovakia in October 1950 and the US exported 254 short tons of potassium nitrate to China between July 1950 and October 1950. China has bought some of these products from the US in previous years and small amounts also went to other satellites.

Guanidine nitrate is a German development and the USSR no doubt is aware of its usage for propellants, as a muzzle-flash reducing agent, and to a certain extent in some rocket fuels. There is no specific evidence concerning Soviet Bloc production or imports.

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List II. No. 2754

Polyisobutylene

D. Soviet Bloc Needs and Availabilities.

Soviet Bloc shortages of equipment required in the separation of isobutylene from other hydrocarbon gases may indicate the existence of a shortage of polyisobutylene.

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